

REMARKS

Claims 11-16, and 27-32 are pending. Claims 1-10, and 17-26 have been canceled. No claims have been allowed.

Applicant notes that the Examiner has approved of the drawings.

Applicant notes that the objection to the specification, specifically to the Abstract of the disclosure, has been withdrawn.

Applicant notes that the rejection of claims 21-26 under 35 U.S.C. 112, first paragraph, has been withdrawn as claims 21-26 have been canceled.

Claims 11-14 and 27-30 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Applicant has amended claims 11 and 27 whereby they now call for supplying into the chamber a cleaning gas containing at least one of a fluorine atom and a chlorine atom. Applicant notes that the Examiner has agreed that the specification teaches the use of a fluorine- or a chlorine-containing gas.

Applicant notes that the rejection of claims 11 and 27 under 35 U.S.C. 102 (b) as anticipated by Dietz et al., U.S. Patent No. 4,452,642, has been withdrawn.

Claims 11, 12, 27, and 28 are rejected under 35 U.S.C. 103(a) as unpatentable over Bluck et al. in view of Dietz et al. and Matsuyama for the reasons set forth in paragraphs 13-14 of the previous Office Action.

Bluck et al. teaches a plasma processing system and method. Bluck et al. does not correct the shortcomings of Dietz et al. pointed out hereinabove. Dietz et al. teaches a cleaning method which uses hydrogen gas (see column 2, lines 5-12) and thermally decomposing the hydrogen gas with a hot element at a temperature above 1300° C. At least part of the hydrogen molecules are converted into hydrogen atoms or ions. In Dietz et al.'s method, the heating element will not react with the hydrogen atoms or ions and the heating element is therefore not consumed by such gases, as opposed to the instant invention which uses a very corrosive gas.

Matsuyama has been previously applied by the Examiner and discussed by Applicant (see the Amendment dated October 1, 2002). Matsuyama teaches activating gases for depositing a film within a chamber rather than removing a deposited film with an activated gas. Thus, Matsuyama teaches away from Applicant's invention.

Matsuyama teaches that the filament material will be determined by taking into consideration the reactivity of the filament with various kinds of gases, heat resistance, etc. (see column 9, lines 33-37). Matsuyama further teaches that the material for his filament can be selected from a group of metals including platinum. However, in the specific examples provided by Matsuyama, only tungsten is described (see column 9, beginning at line 53).

In Example 4, the material of the filament is not described. In Example 5, although Si<sub>2</sub>F<sub>6</sub> and GeF<sub>4</sub> gas generate an F-radial or F-activated species which is very corrosive to tungsten, a tungsten filament is still employed. As set forth in the instant specification, a tungsten filament will react with an F-radial or F-activated species and therefore gradually become thin, which will decrease the reproducibility and productivity of film formation. Applicant therefore believes that tungsten is not suitable in a situation where a gas containing a fluorine or a chlorine atom is used. Applicant submits that Matsuyama would not have recognized that his tungsten filament is etched by a cleaning gas containing a halogen atom at a high temperature, nor that a platinum filament is not etched and is stable when used with such a cleaning gas.

Applicant respectfully submits that none of the cited references nor the combination thereof teaches Applicant's claimed invention. Furthermore, even if the cited references could be combined, the resulting structure would not anticipate nor render obvious Applicant's invention. Applicant therefore respectfully submits that claims 11, 12, 27, and 28 distinguish over and are not obvious in view of the cited references.

The Examiner has stated in paragraph 19 of the Office Action that Applicant's arguments that Matsuyama would not have recognized that a platinum filament is not etched and is stable when used with a halogen containing cleaning gas is mere speculation. The Examiner stated that there is no evidence on the record to suggest that one of ordinary skill in the art, at the time of the Applicant's invention, would have expected a platinum hot filament not to function successfully in activating halogen containing cleaning gases.

Applicant submits herewith a copy of a Japanese paper (Exhibit 1) which was prepared on June 21, 1999. This paper was prepared by the inventor of the instant patent application,

namely, Mr. Keiji Ishibashi. Applicant also submits herewith an English language translation (Exhibit 2) of the Japanese paper together with a Verification Of Translation.

Finally, Applicant submits herewith a Declaration by the inventor stating that he prepared the enclosed Exhibit 1 on June 21, 1999. Exhibit 1 indicates that, on June 21, 1999, the date on which he prepared the enclosed Exhibit 1, while it was generally known to those skilled in the art that the reaction rate of wire with a cleaning gas increases as the temperature rises, the experimental data in the enclosed Exhibit 1 indicated to the inventor that when a hot element is heated to a (threshold) temperature or higher (2000° C. in the case of tungsten wire), the wire is prevented from being etched, thereby extending its life. This is contrary to what one skilled in the art would have anticipated. Such behavior of wire to a corrosive cleaning gas could not and cannot be anticipated from the general relation between reaction rate and temperature.

This is also true for platinum wire, although the corrosion resistance of platinum wire to a cleaning gas is known to be higher at low temperatures than other metals, such as tungsten. Various fluorine compounds and chlorine compounds of platinum are known, as shown, e.g. in the CRC Handbook of Chemistry and Physics. Therefore, a person skilled in the art, who knows that the reaction rate of platinum to produce platinum fluoride or platinum chloride increases as the temperature rises, would have avoided heating platinum wire to a high temperature in the cleaning gas atmosphere since he would have expected that the platinum wire would be broken in a short time while exposed to a high temperature. On the contrary, platinum wire is in actuality prevented from being etched at a threshold temperature of 400° C. or higher. Thus, the present invention would have been unobvious to one skilled in the art as shown by the enclosed paper.

Applicant also notes that platinum has been advantageous in that the threshold temperature of 400° C. is low as compared to the threshold temperature of tungsten of 2000° C. Thus, Applicant submits that the enclosed information is evidence to suggest that one of ordinary skill in the art at the time of Applicant's invention would not have expected a platinum hot filament to function successfully in activating halogen containing cleaning gases.

Claims 13, 14, 29, and 30 have been rejected under 35 U.S.C. 103 as unpatentable over Bluck et al., Dietz et al., Matsuyama, and Iwasaki et al. All these claims depend from either

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claim 11 or 27. For the reasons given above, Applicant submits that those claims are also not anticipated by nor rendered obvious in view of the cited references.

Claims 15, 16, 31, and 32 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bluck et al., in view of Dietz et al., Matsuyama, and Hatano et al. All these claims depend from claims 11 or 27. Applicant submits that the cited prior art does not cure the defect of Dietz et al. pointed out hereinabove. Applicant therefore submits that claims 15, 16, 31, and 32 distinguish patentably over the cited references and are not obvious in view thereof.

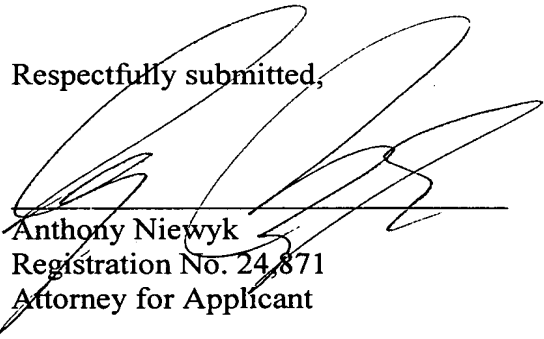
Applicant notes that the Terminal Disclaimer has been recorded and that the Examiner has withdrawn the obviousness-type double patenting rejections of claims 26-29.

In view of the above, Applicant respectfully submits that all claims at issue distinguish patentably over the prior art of record and are in condition for allowance.

In the event Applicant has overlooked the need for an additional extension of time, payment of fee, or additional payment of fee, Applicant hereby petitions therefor and authorizes that any charges be made to Deposit Account No. 02-0385, Baker & Daniels.

Should the Examiner have any further questions, he is respectfully invited to telephone the undersigned at 260-460-1695.

Respectfully submitted,



Anthony Niewyk  
Registration No. 24,871  
Attorney for Applicant

AN/mld  
BAKER & DANIELS  
111 East Wayne Street, Suite 800  
Fort Wayne, IN 46802  
Telephone: 260-424-8000  
Facsimile: 260-460-1700